Designing Stream Crossings in the 21st Century

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Governor and Council Breakfast
March 25, 2015

THE CULVERT SITUATION

- Infrastructure is aging
- More people = more houses and pavement = more runoff
- Weather patterns have changed
- Culvert Failures

THE CULVERT SITUATION

Results:

- Public safety
- Repair/Replacement
- $$$

Communities/DOT are asking for help

INVESTMENT

It's not a question of IF we'll pay

It's a question of WHEN we'll pay

We can plan ahead & get where we want to go

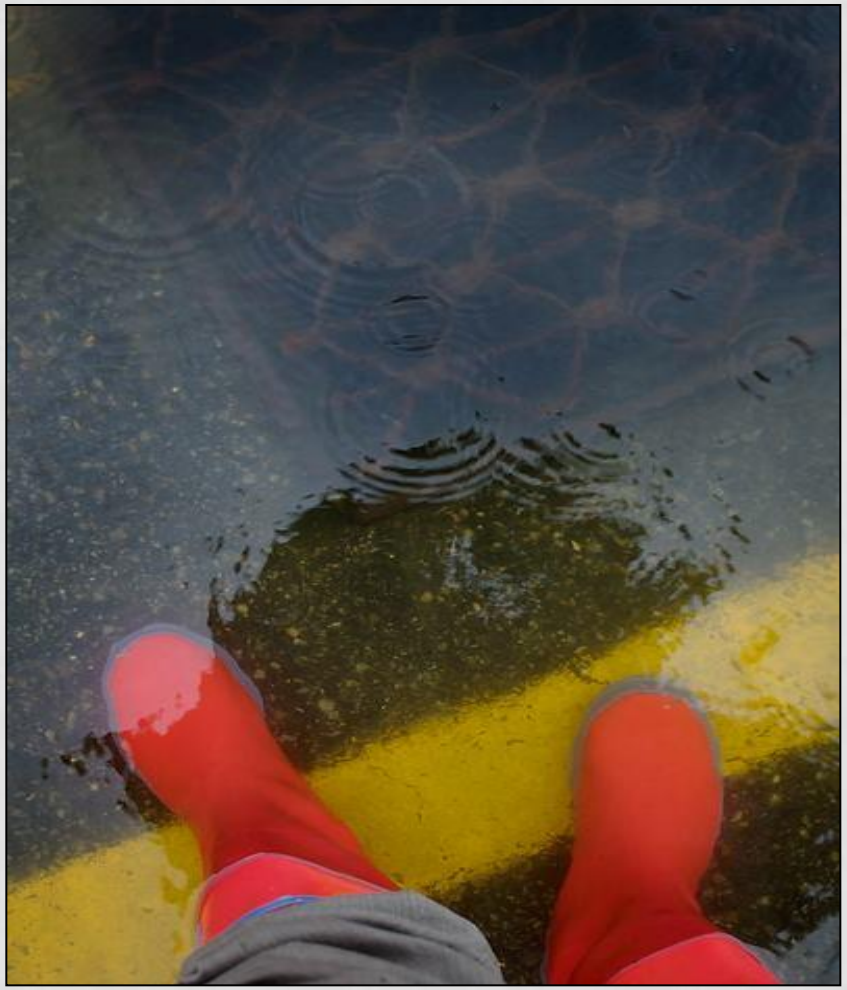
Anticipatory

We can incur damages, clean up, loss of new infrastructure

Reactionary

TODAY'S AGENDA

- NH Storm Event Data
- Examples of the Problem
- DES Regulations
- DOT Perspective
- New ways the state is assisting communities/DOT



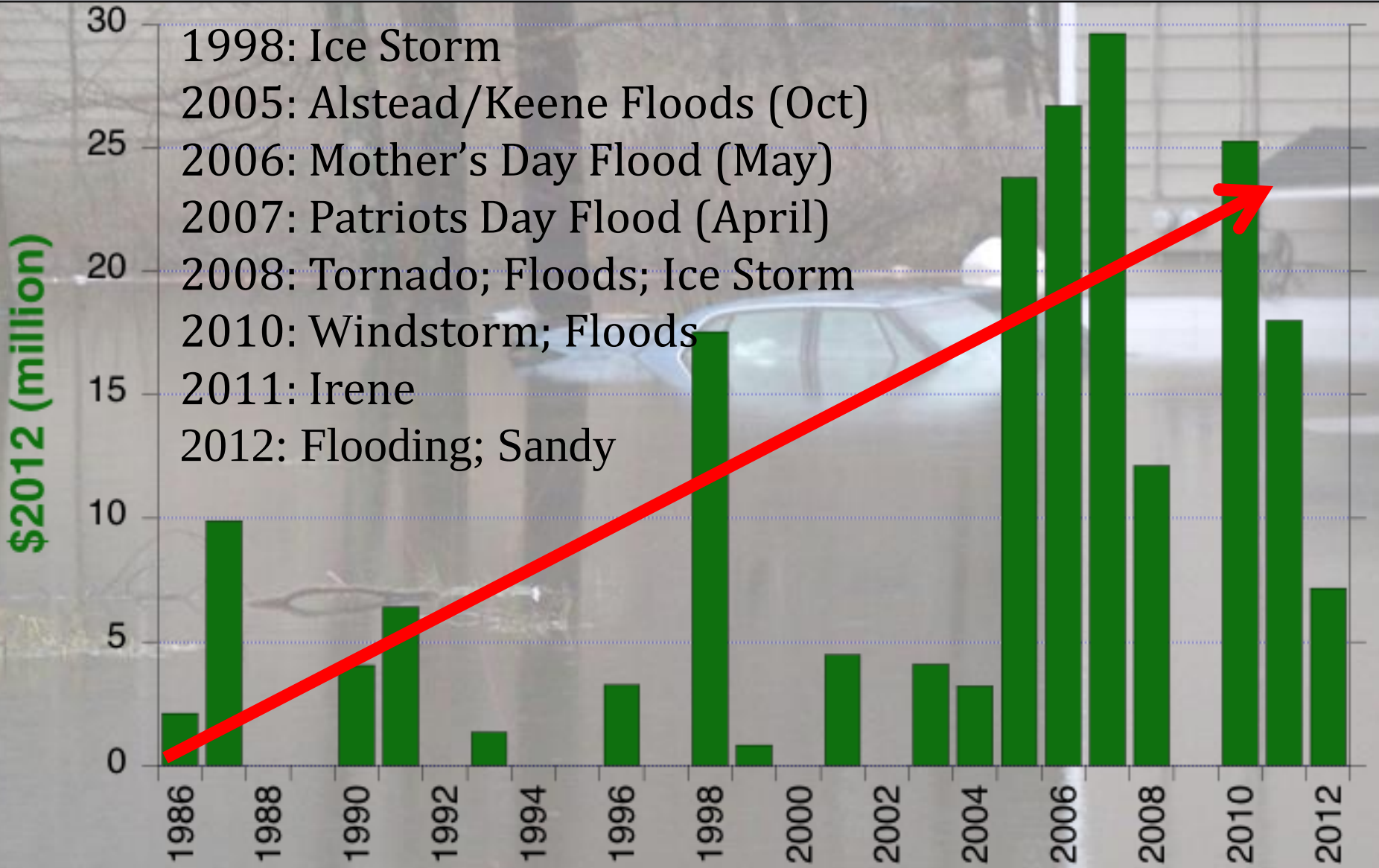
RECENT FLOODING IN NEW HAMPSHIRE

- NH has seen dramatic increase in precipitation & flooding over the last decade.

- Since 2005, flooding and its effect on rivers has caused at least $91.1 million in damages, and 4 fatalities.


Dover – April, 2007

Federal Expenditures on Presidentially Declared Disasters & Emergency Declarations in NH



Data from: www.fema.gov/disasters/grid/state-tribal-government

EXAMPLES OF THE PROBLEM, ALSTEAD, 2006


Alstead


Alstead

Alstead


Alstead

EXAMPLES OF THE PROBLEM, LEBANON, 2013

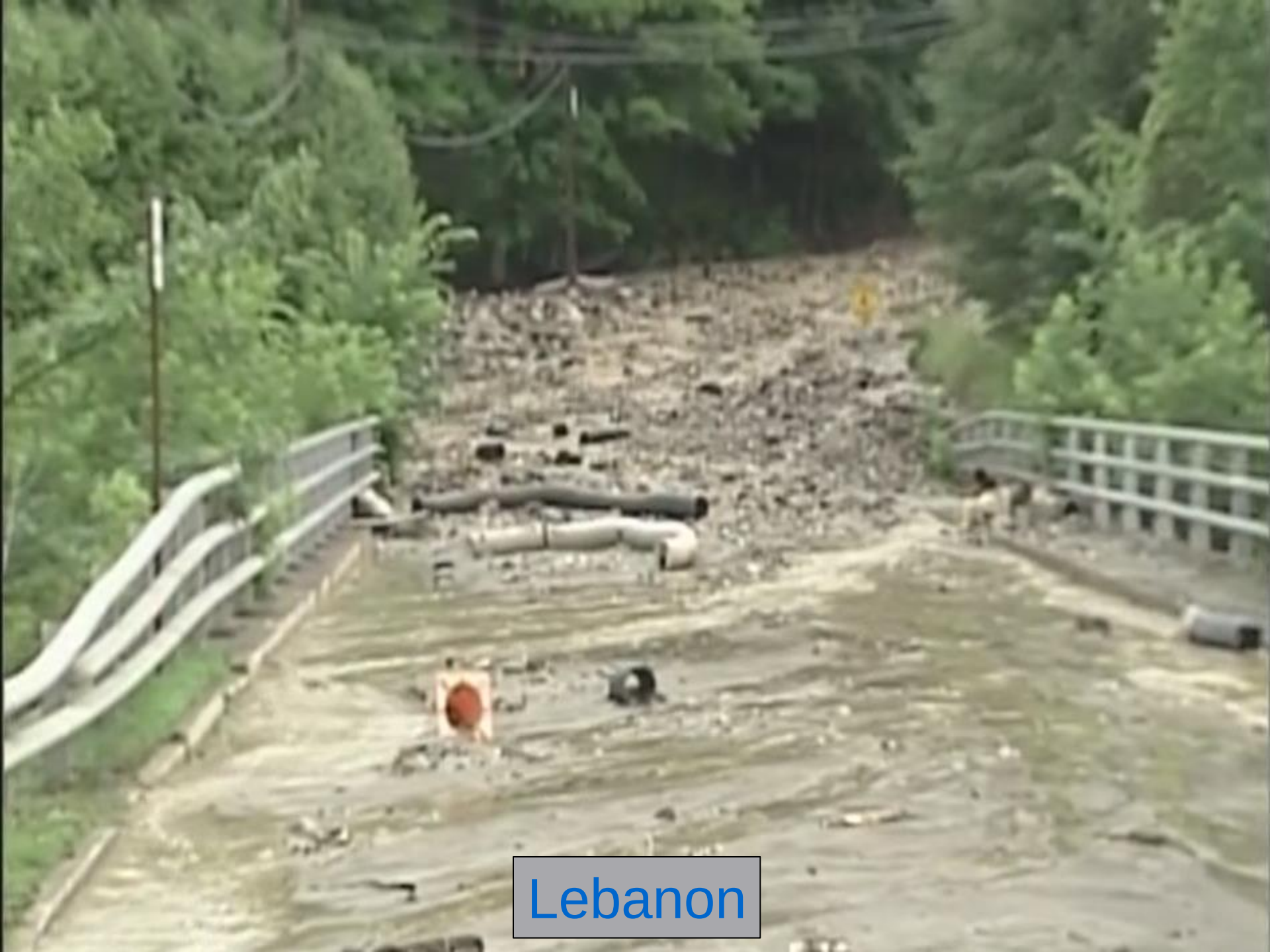

Lebanon


Lebanon


Lebanon


Lebanon


Lebanon


Lebanon

NHDES *Wetlands Permit Applications* Received to Replace or Upgrade Culverts and Bridges Per Year:

From NHDOT: 30

From Municipalities: 53

45 Emergency Authorizations issued to *repair/ replace* damaged crossings.

New Hampshire House Bill 648

Chapter 179 Laws of 2007

Comprehensive Flood Management Study Commission

Final Report

September 2008

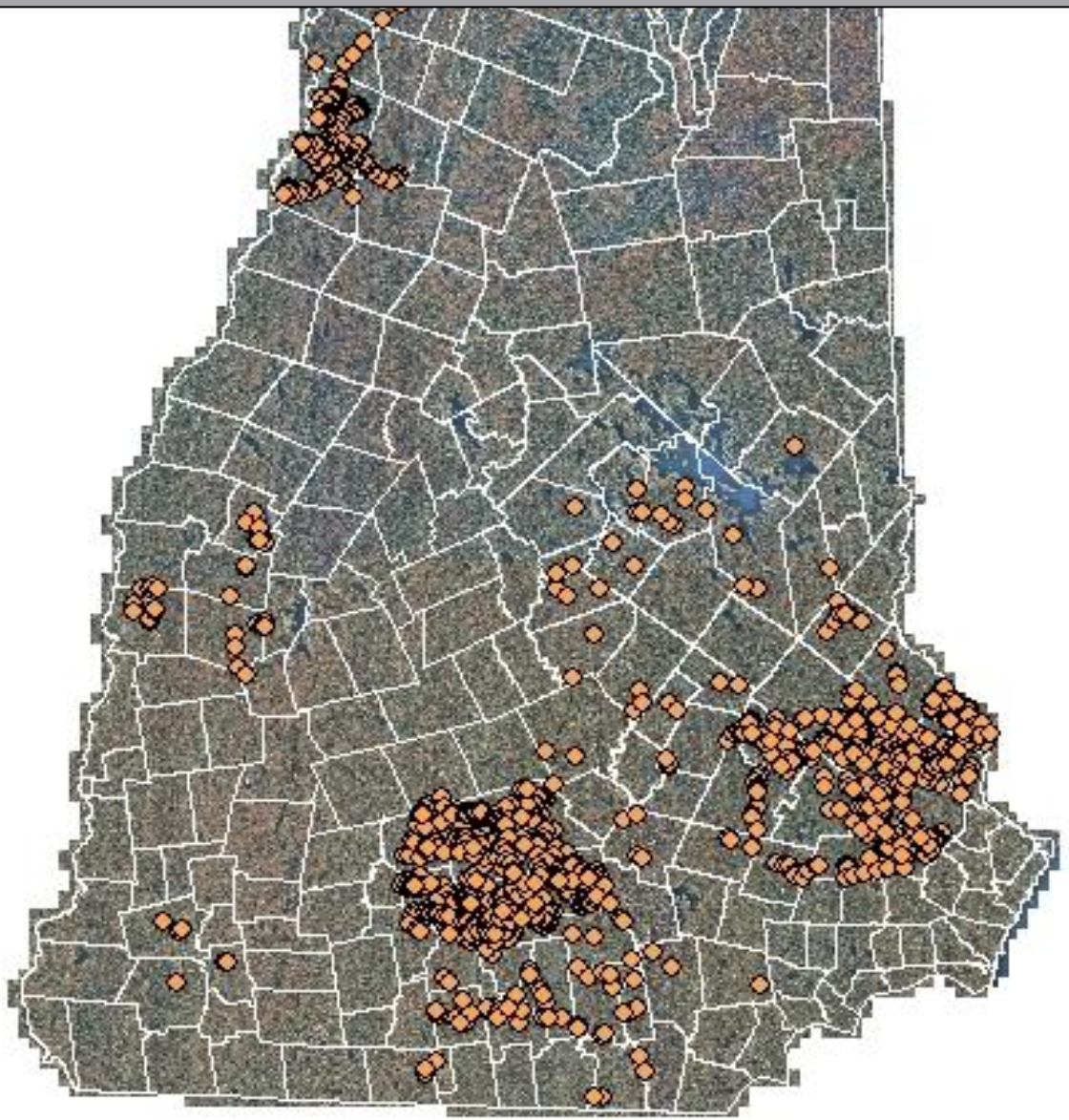
HB 648 COMPREHENSIVE FLOOD MANAGEMENT STUDY COMMISSION: KEY FINDING

NEED: ENSURE THAT BRIDGES AND CULVERTS ARE ADEQUATELY SIZED.

"DOT, DES and Fish & Game with input by the Nature Conservancy, should be tasked to develop the procedure and database for a standard culvert assessment data collection."

HTTP://GENCOURT.STATE.NH.US/STATSTUDCOMM/REPORTS/1853.PDF

Stream Crossings Assessed in New Hampshire with Data Available – 2009 to 2014.




Claremont

HB 648 COMPREHENSIVE FLOOD MANAGEMENT STUDY COMMISSION: KEY FINDING

NEED: ENSURE THAT BRIDGES AND CULVERTS ARE ADEQUATELY SIZED.

Guidance for Wetlands Bureau *Stream Crossing* Rules:

- 100-year frequency storm
- No increase in flood stages on abutting properties
- No adverse effect on channel stability
- Provide in-lieu fee mitigation option

PERMITTING BACKGROUND

- State permitting authority for impacts to state wetlands (and surface waters), since 1967
- Federal authority:
  - Federal Clean Water Act: Section 404-wetlands, 1972; Section 10 of the Rivers and Harbors Act of 1899
  - 1992 through 2012 - US Army Corps of Engineers' NH Programmatic General Permit (PGP), updated and renewed every 5 years

CORPS: NH PROGRAMMATIC GENERAL PERMIT - STREAM CROSSINGS

21. Waterway/Wetland Work and Crossings

(a) All temporary and permanent crossings of waterbodies and wetlands shall be suitably culverted, bridged, or otherwise designed to withstand and to prevent the restriction of high flows, to maintain existing low flows, and to not obstruct the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.

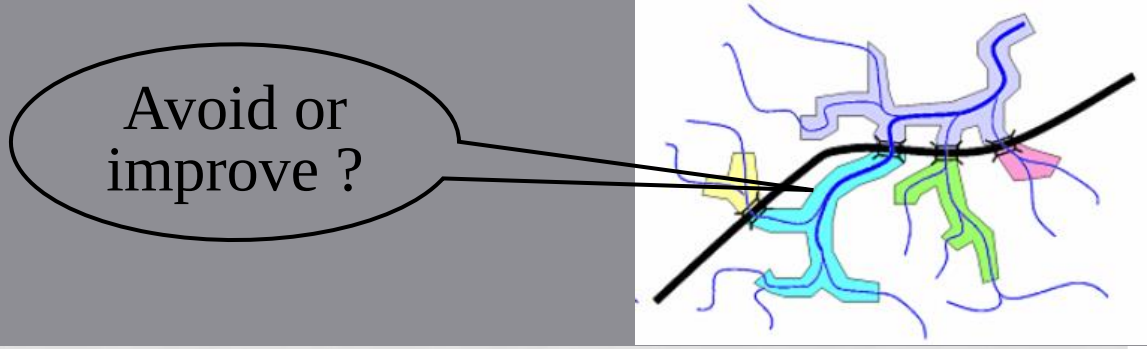
(b) Aquatic Life Movements. No activity may substantially disrupt the necessary life-cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water.

(c) All temporary and permanent crossings of rivers, streams, brooks, etc. (here on referred to as "streams") shall conform to the "New Hampshire Stream Crossing Guidelines" when the State has adopted these guidelines as regulations. The Corps shall review projects under the Minor/Major or IP review procedures if conforming to the Guidelines is impractical. The Guidelines typically require bridge spans, open bottom arches or embedded culverts. Bridge spans are generally preferred.

PURPOSE OF STREAM RULES:

- Enhance public safety
  - Recent flood damages
  - Adapting to climate change
- Preserve functions and values of stream systems
- Wildlife and Fishery habitats
- Support restoration of degraded streams and improve aquatic life passage and sediment transport.

GENERAL DESIGN CONSIDERATIONS



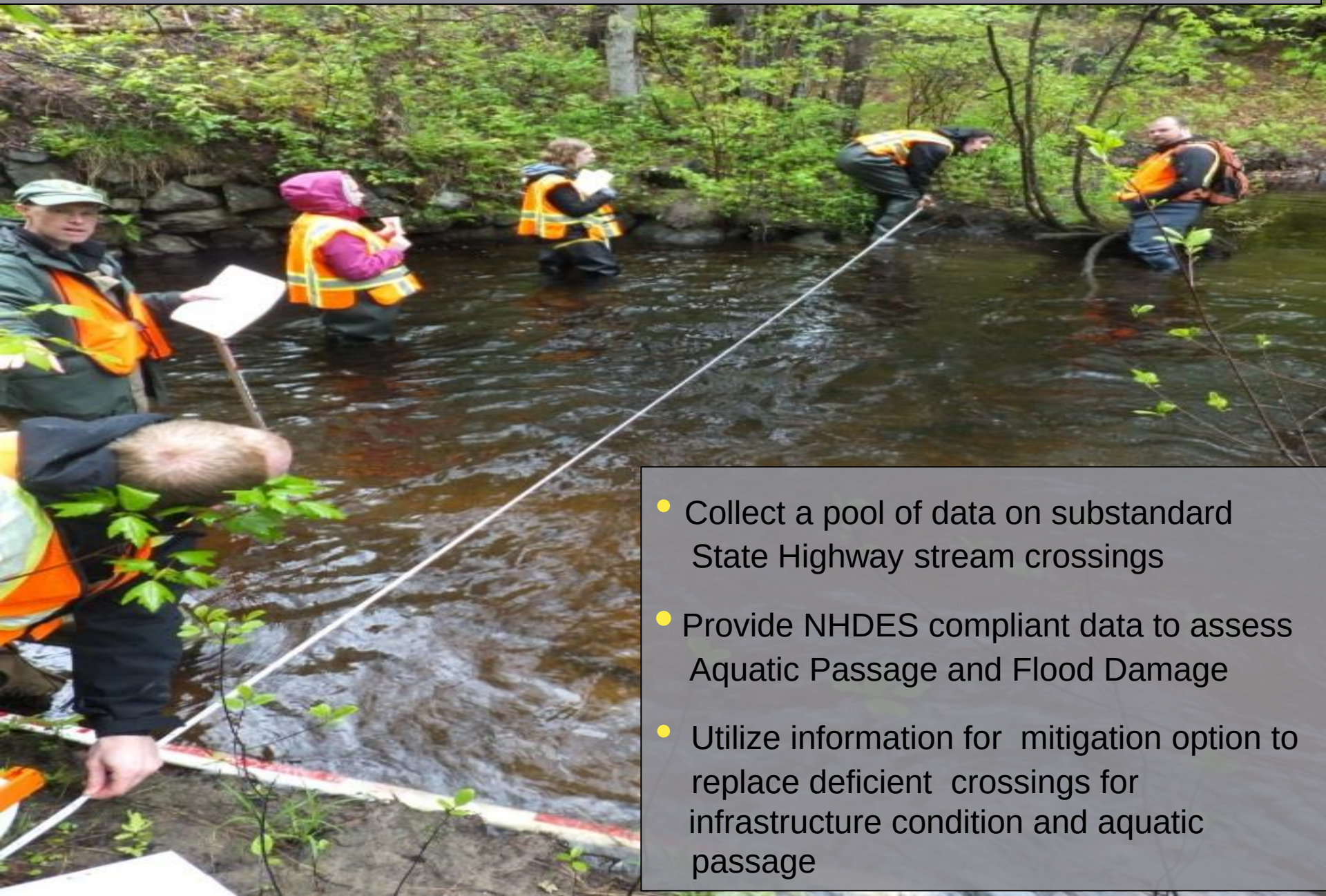
Stream crossings shall NOT:

- Be a barrier to sediment transport
- Restrict high flows
- Obstruct Aquatic Organism passage
- Cause Flooding
- Cause Erosion
- Degrade water quality degradation

ALTERNATIVE DESIGNS [ENV-WT-904.09]

- The applicant shall propose an alternative design if installing the structure specified in the applicable rule is not practicable.
  - Applies to existing AND new crossings
  - Submit a written request
  - Submit a technical report prepared by an environmental scientist or PE
  - Report explains how the proposed alternative meets the criteria for approval.

NHDOT Culvert Assessments



- Collect a pool of data on substandard State Highway stream crossings
- Provide NHDES compliant data to assess Aquatic Passage and Flood Damage
- Utilize information for mitigation option to replace deficient crossings for infrastructure condition and aquatic passage

NHDOT DATA COLLECTION

- Query maintenance personnel on trouble spots, Filter 1 Condition Report
- Collect NHDES compliant field data with Ipads
- Post collection data review and geo-referencing

NHDOT Stream Crossing Condition Report

Filter I

Date of Site Visit: ________ Observer(s) Name(s): _____

Time of day: _____ Maintenance Section: _____

Town: _____ Street/Road/: *(include Route #)* _____

Location of Crossing at centerline of roadway: Latitude: _____ Longitude: _____

Waterbody Name (*if applicable*): _____

Brief description of location and condition of structure: _____

How many structures are located at the crossing (*circle one*)? 1 / 2 / OTHER: _____

Is there a history of crossing failure (i.e. emergency repairs, overtopping)?: _____

Are there any notable features upstream or downstream of the crossing (i.e. beaver dams)?: _____

What is the condition of the structure(s) (*circle all that apply*)? ERODING / NEW (GOOD) / OLD / COLLAPSING / RUSTED / OUTLET DROP OFF / OTHER: _____

Examples of Structure Condition


Eroding


New (Good)


Old


Collapsing


Rusted


Outlet Drop Off

“SADES”

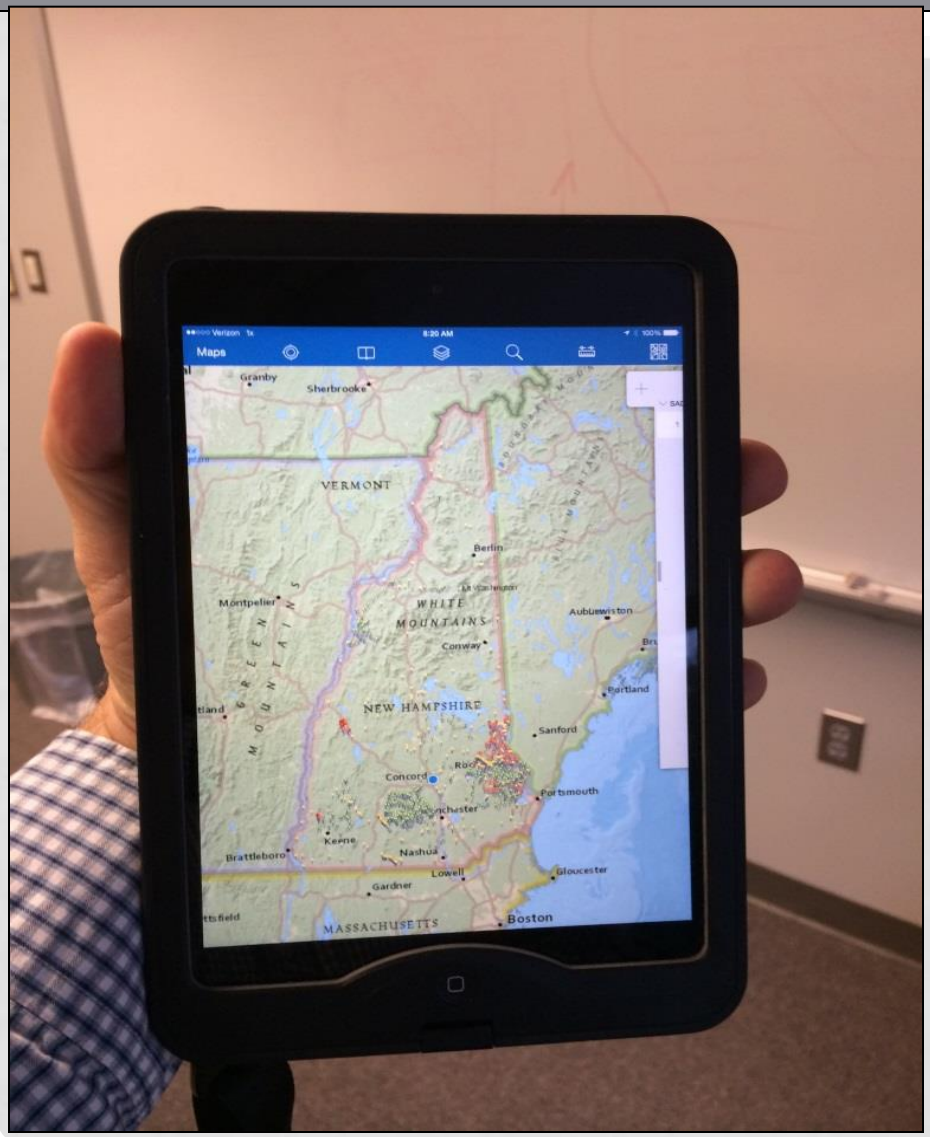
STATEWIDE ASSET DATA EXCHANGE SYSTEM

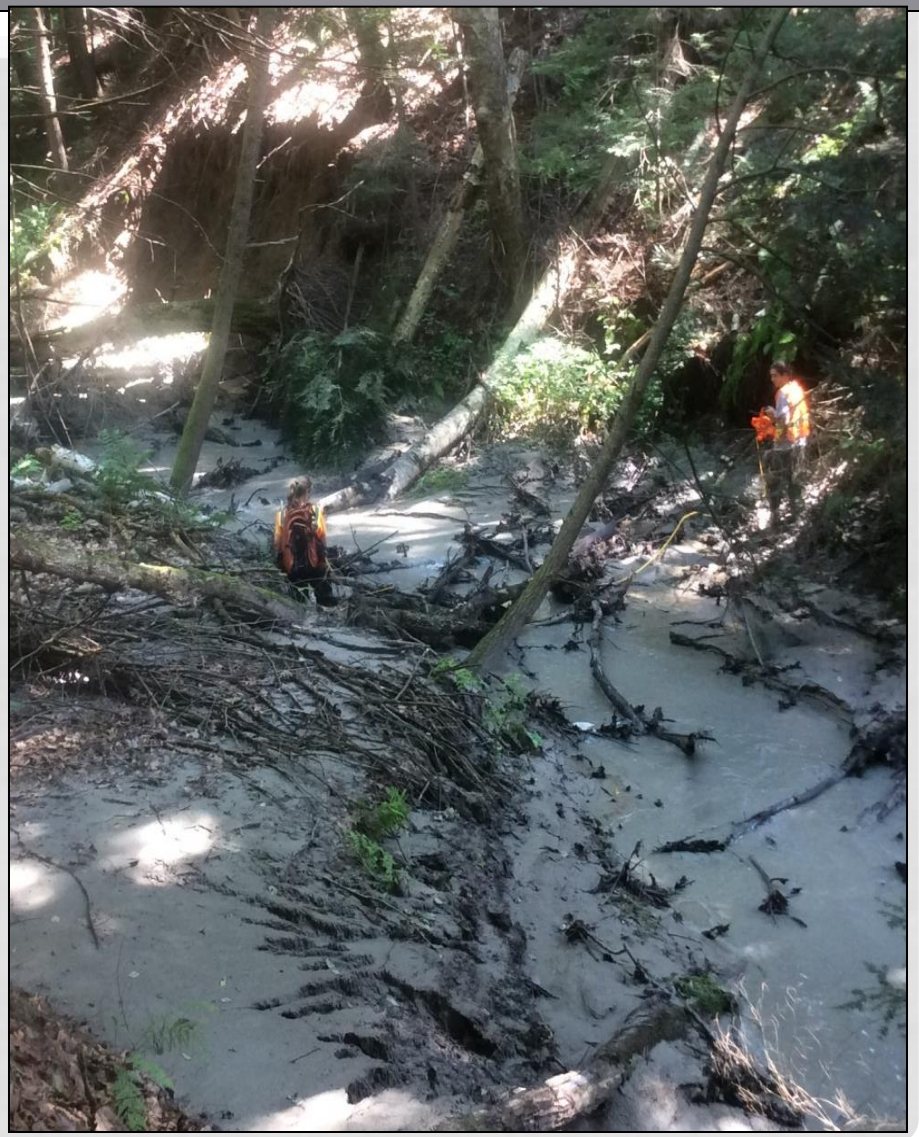
New Hampshire DOT
Department of Transportation

NEW HAMPSHIRE
DEPARTMENT OF
Environmental
Services

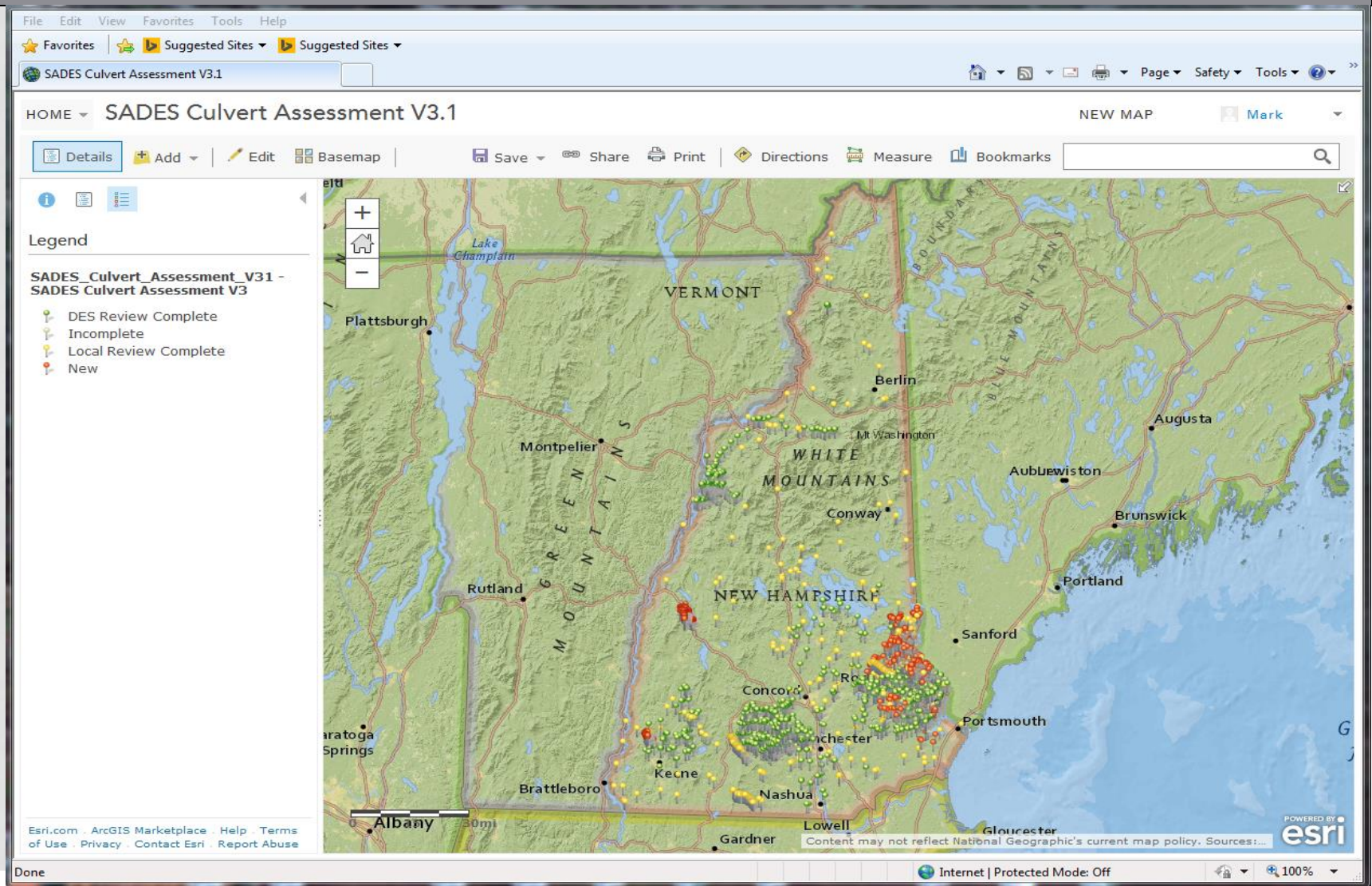
- Cloud Based / ArcGIS Online
- Ipad, Web and Desktop applications
- WiFi / Cell Data / Ethernet Connection to the Cloud
- Multiple users using the same data, crowd-sourcing

IPAD (FIELD COLLECTION)





WEB BASED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Mt Washington
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GREEN MOUNTAINS
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Augusta
Auburn
Lewiston
Conway
Brunswick
Rutland
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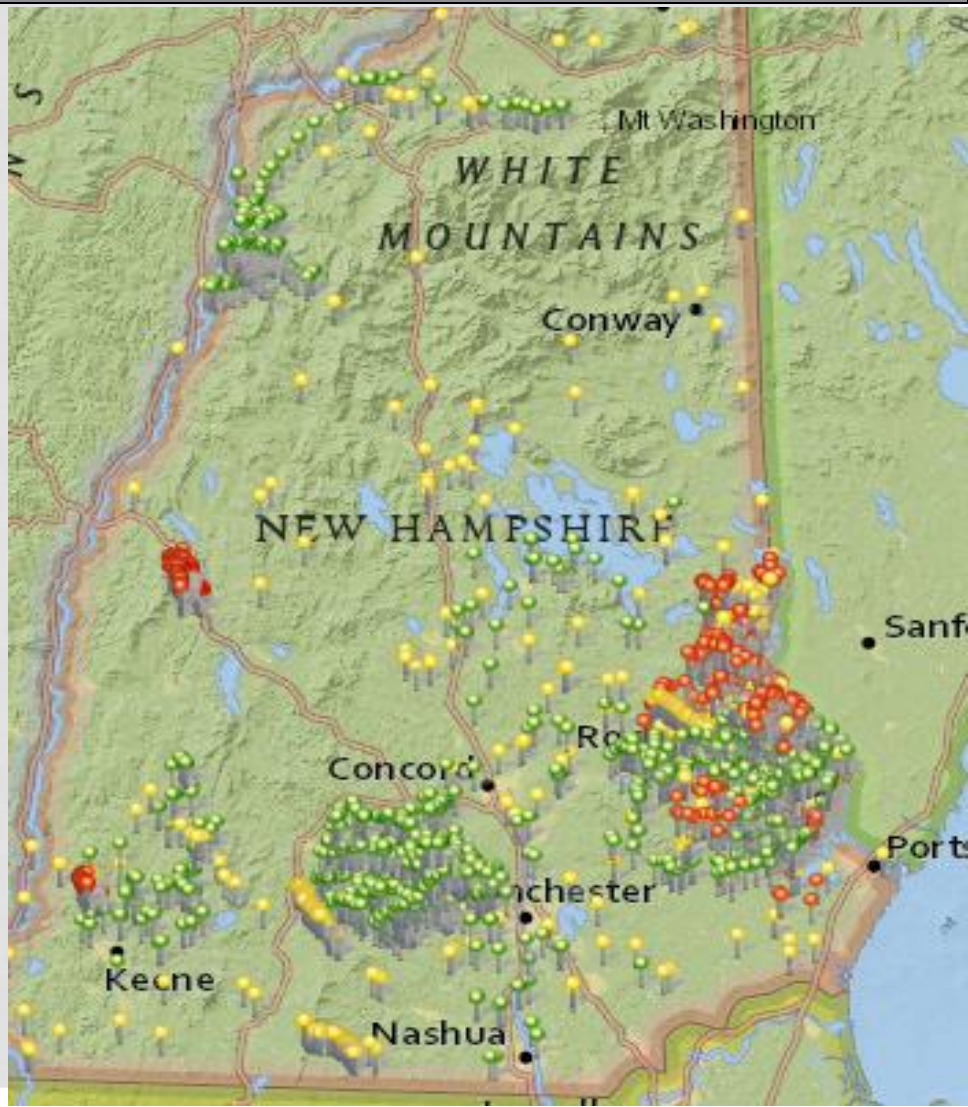
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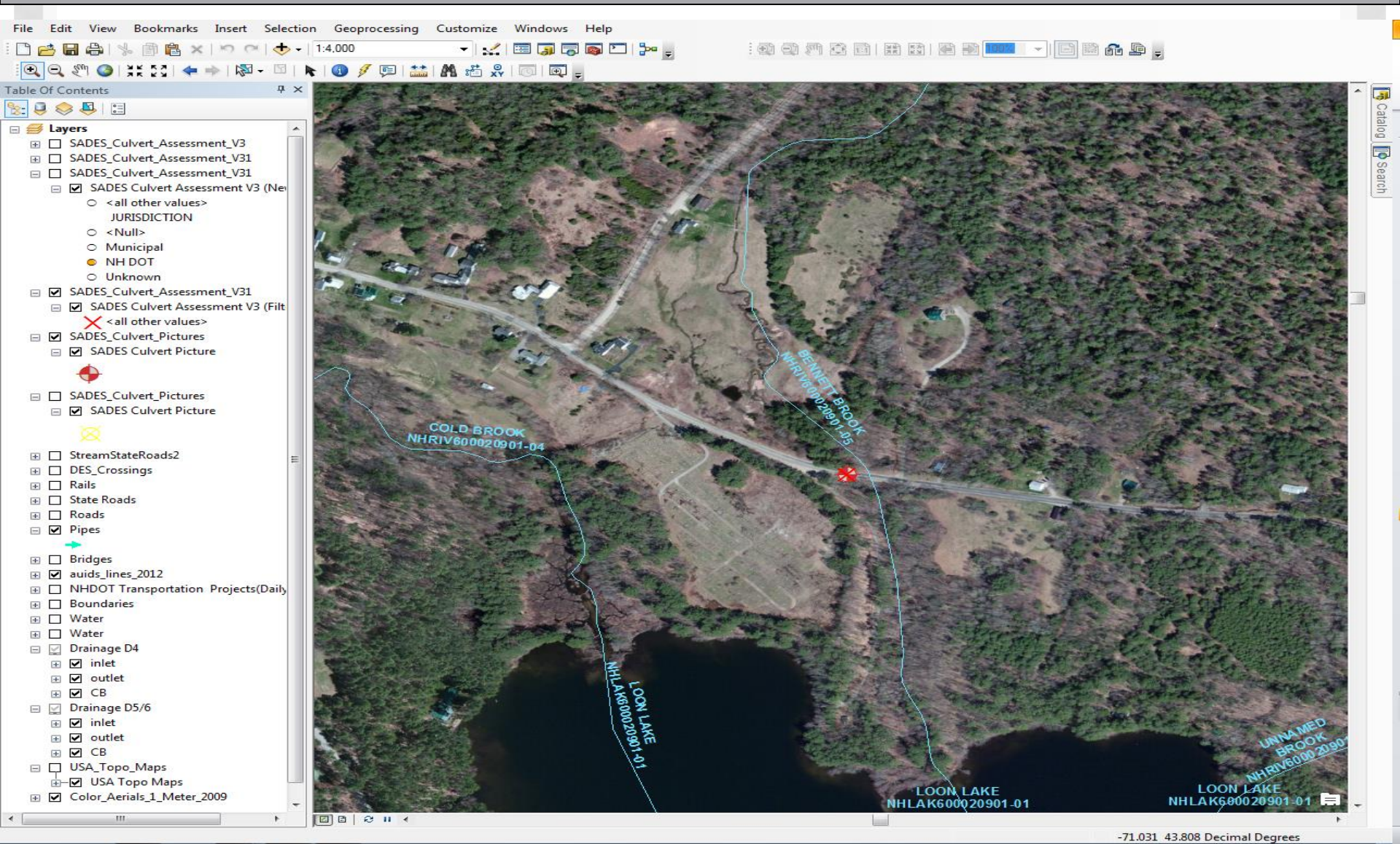
MOUNTAINS
Conway
NEW HAMPSHIRE
Concord
Keene
Nashua

CLASSIC ARCGIS DESKTOP



NHDOT DATA ROUND UP

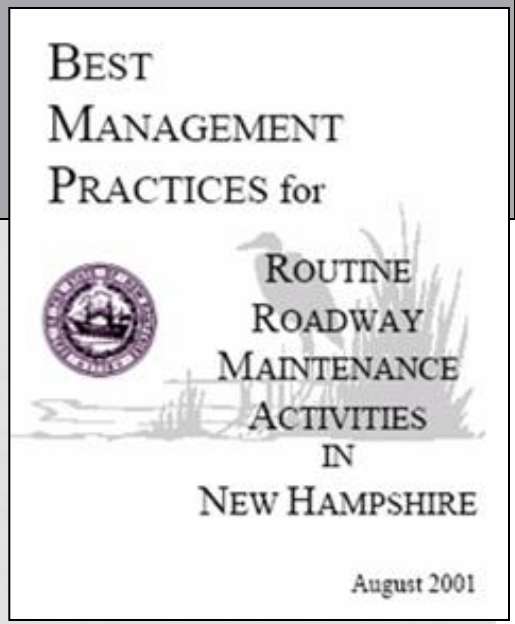
- NHDOT – 164 crossings
- DES – 269 crossings
- Regional Planning Commissions – 304 crossings
- Municipal crossings - 1,254

- **Total:** 1,991 crossings on State Highways which include 508 named rivers

WHAT IS NHDES DOING?

- Partnered with UNHT2 to create Routine Roadway Culvert Certification program
- Developed ILF Stream Mitigation Option
- Continuing to assess stream crossings & problem areas.

NOTIFICATION FOR ROUTINE ROADWAY MAINTENANCE ALLOWABLE PROJECTS



- DES has processed 1,000 Notifications to date
- Culvert Extension at the Same Location
  - Up to 10 feet at each end
  - Max single 48" culvert
- Culvert Replacement and Relocation
  - Max single culvert 48"
  - Can increase a smaller culvert up to 50% to a max of 48"
- Embankment Stabilization
- Headwall Repair, Replacement and Construction
- Roadside Ditch Maintenance and Culvert Cleaning

NEW HAMPSHIRE CULVERT MAINTAINER TRAINING PROGRAM

CULVERT MAINTENANCE, REPAIR, AND REPLACEMENT

CULVERT MAINTAINER CERTIFICATION PROGRAM OVERVIEW

- Any Municipal or State employee can become certified provided they:
  - Attend the approved UNHT^2 course and pass the exam
  - **Or**, hold a PE license
  - 273 individuals certified to date (over two years of program)
- Certified Culvert Maintainer must:
  - Use Best Management Practices
  - File Quarterly Work Summary to NHDES
  - Be certified or recertified every two years

AQUATIC RESOURCE MITIGATION (ARM) FUND SUPPORT

- ARM Funds have been awarded to assist communities to mitigate for flood and culvert failures:
- Town of Alton received $23,000 ($118,675 match)
- City of Dover received $440,000
- Francestown Land Trust received $237,000
- Manchester: NH Rivers Council received $65,400 ($134,800 match)

SOME SPECIFIC SOURCES OF FUNDS:

- DES - Aquatic Resource Mitigation (ARM) Fund & 319 funds (Federal)
- NH Fish & Game Moose Plate Program
- FEMA - Hazard Mitigation
- Federal Highway Administration, NOAA, NRCS

FOR MORE INFORMATION:

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William J. Cass, NHDOT Director of Project Development: 271-6152